THE
VETERINARY JOURNAL

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Biography

RESIGNATION OF PROFESSOR SIR JOHN McFADYEAN, M.B., B.Sc., M.R.C.V.S., LL.D., F.R.S.E.

THE whole profession, and especially his old students, will learn with regret of the resignation from the post of Principal of the Royal Veterinary College, London, of Professor Sir John McFadyean, as it severs the strongest link which has ever existed in the chain between the laboratory and veterinary practitioners, not only of British nationality (for science recognises no differences in this respect), but all over the civilised world.

Ever since his graduation from the Royal (Dick) Veterinary College in Edinburgh in 1876, and his appointment there, first as Professor of Anatomy and subsequently as Professor of Pathology and Bacteriology, then as Principal and Dean of the College in London, Professor McFadyean's name has been a household word in veterinary circles in every civilised country of the world.

It is quite impossible to over-estimate the great influence he has had in advancing the position of the veterinary profession in Great Britain, and to attempt to detail a hundredth part of the work he has done for us would fill a volume.

His work is well known to every one, and his well-thought-out opinion has always been freely given, both to student and practitioner, upon request. Few of us but what owe him a personal debt in this respect, and our heartfelt wish is that he may live for many years to enjoy, with Lady McFadyean (who, as the daughter of another much-beloved teacher, the late Professor Walley, is also endeared to the profession), a well-earned rest; not, however, in such retirement that his mature and well-balanced judgment cannot still be accessible for helping to unravel the many intricate problems which come forward again and again in matters pertaining to the veterinary world.

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Editorials

THE QUESTION OF STUDENT PUPILAGE WITH A PRACTITIONER.

Now that the colleges are closed one wonders what the student is doing in the vacation, and whether, like the wise virgin of Scripture, he is keeping his lamp of knowledge lit; or whether he is merely wasting his time. Let us hope that he is to be found amongst those who are leading the busy life of practice, whether in town or country, for there is no training which exercises the powers of observation of the student more than to be in daily contact with owners and their animals. It is a training ground in itself and so much at variance with the theoretical book life of college that it is not only a valuable ground for study, but it savours of the "change which is as good as a rest."

In connection with this subject, after a well-sustained discussion upon "Practical Pupilage: Its Advisability (or necessity) for the Veterinary Student," held in Leeds on July 27th, before the members of the Yorkshire Branch of the National Veterinary Association, the following resolution was unanimously passed:—

"That in the interests of the profession, the veterinary student should, during the college vacations, take every opportunity (after passing the Matriculation Examination) for gaining acquaintance with the practical details of his professional work; and that the Council of the Royal College shall be asked to consider whether, after 1928 (or some such reasonable date) it is not advisable to institute some bye-law which, by a form of pupilage, will *necessitate* that a student spends at least twelve months of his vacations in contact with actual practice before presenting himself for the Diploma."

Such a course will be of incalculable benefit to the student and will be undertaken during the receptive age, as this is where many fail. A boy of 18 or 19 years of age will learn the smaller details and the "rough and tumble" of his future professional life much quicker and better than one who has seen no practice and becomes pitch-

forked into it only after obtaining the Diploma. To arrange to be with one practitioner for the whole of the College Vacations is better than to dodge about for a fortnight here or a month there, and there are plenty of busy practitioners who are willing to accept some small payment to cover board and lodging just because they like a student's companionship, so that the benefit is thus mutual.

To waste the precious time of the vacation is criminal and one cannot but express the hope that the resolution unanimously passed by the Yorkshire Society will bear good fruit, and help to do away with the reproach of obvious ignorance of the simpler details of the habits of animals which one so often hears expressed against our newly fledged graduates.

A SPECIAL "HUMANITY TO ANIMALS" NUMBER: THE VETERINARY ASPECT.

OUR next issue is to be devoted to a special "Humanity to Animals" number from the veterinary aspect, a subject very much neglected in the columns of the Daily Press, but carried out every hour of the day in some way or other by the members of the veterinary profession. Not in "sob stuff" fashion, but in a manner which is the true Christian spirit and embodies the principle of "the greatest good for the greatest number."

A number of articles bearing on this subject are already in print, but we shall welcome contributions of all kinds from our readers, for there is no body of men who have better opportunities for expressing humanity to animals than the members of the veterinary profession; and it is our own fault, chiefly from a false idea of modesty, that we are not the first to be universally thought of as the chief experts who shall decide upon all questions bearing upon cruelty and inhumanity, or otherwise, to animals.

If we will only claim our rights (and this is one of them) and make ourselves heard a little more, our profession will come much quicker and more fully into what is, after all, its right and its own.

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General Articles

THE DOUBLE INTRADERMIC TEST IN CATTLE.

By T. DALLING, M.R.C.V.S., J. H. MASON, M.R.C.V.S.
AND W. S. GORDON, M.R.C.V.S.,
The Wellcome Physiological Research Laboratories, Beckenham, Kent.

OUR interest in the double intradermic tuberculin cattle test arose from a suggestion which had reached us that a given tuberculin, which on the official guinea pig test had been proved equal to the (Koch's) Frankfort standard, might fail to give "positive" reactions in tuberculous cattle when used in the double intradermic test, while another sample similarly standardised gave definite reactions. (We may here anticipate our findings by stating that we found no evidence for the truth of the suggestion.) We soon found that we had to investigate many points before we could get a satisfactory answer to our question, so that our enquiry, instead of being merely an investigation of tuberculin, had to become an investigation of the consistency of conclusions drawn from the test.

Owing to the broadminded attitude and friendly interest of several owners of dairy herds within reasonable distance of our laboratory, we were able to carry out intradermic work on a mixed dairy herd including milch cows, pregnant cows, heifers, calves and bulls. Our investigations were limited because we were not able to carry out many subcutaneous tests, nor were we able to kill cattle. The restrictions under which we worked must be borne in mind when reading this report. We carried out in all between 400 and 500 tests on 150 animals, mostly cows and heifers.

We have reason to believe that the tuberculin we used in most of this work has proved itself a satisfactory tuberculin for the detection of tuberculosis in cattle.

We are in general agreement with the Tuberculin Committee that the double intradermic test is a convenient one under certain circumstances, and has "come to stay." It is, therefore, of considerable importance to the veterinary research worker and to the veterinary surgeon, acting for the dairy farmer, to define as closely as possible the limitations of the test and its degree of accuracy. We set out with the idea that we had simply to find some dozen "positive reactors" to the test and acquire these as a laboratory test herd of tuberculous animals for repeated experiments in the comparison of various experimental tuberculins in which we were interested. Our early tests, however, indicated that a cow giving a "strong positive" reaction might, a fortnight later, fail to show the same degree of reaction to the same tuberculin. We had, therefore,

to extend our work, for we found that we could not retest in the same animal a point that arose and be certain that the answer in the retest would be the same as it would have been in an original test.

Throughout this report, for the sake of clearness, a double intradermic test is termed D.I.T. It consist of a first injection (F.I.) and a repeat injection (R.I.) 48 hours later. If, at a subsequent date, another double intradermic test is carried out in the same animal, we call it a second double intradermic test or second D.I.T. By first difference (F.D.) we mean the difference between the original thickness of the skin and the thickness after the first injection, *i.e.*, the increase by the reaction following the injection: second difference (S.D.) represents the difference between the original thickness of the skin and that observed after the repeat injection.

I.—The Error of the Test.

In our early tests, carried out over two years ago, we formed the impression that size of swelling produced by the D.I.T. might be taken as an indication of the reaction, though naturally its character and the amount of tenderness and heat were also noted. It soon became evident, however, that the increase in skin thickness alone would not always enable one to make a diagnosis, but that the character of the swelling, tenderness, etc., must all be taken into account.

From a study of many tests we have laid down for ourselves the following rules in reading the results of reactions: (*a*) To be a "positive" reactor a cow must show S.D. of at least 8 mm.; there must be tenderness, recorded as flinching, not when the skin adjacent to the injected area is first gently pinched, but definitely when the injected area is gently manipulated; there must be a palpable thickening with indefinite edges. The question of heat in the injected area cannot always be clearly defined.

In passing we would note that we have practically never found an animal which on character of swelling we wished to place in the "positive" class, unless there was also a large F.D. or S.D.; further, our impression is that a large swelling, *e.g.*, F.D. or S.D. = 20 mm., would in practically all cases indicate a "positive" reaction, though character of swelling had not been recorded. These impressions have been formed by the careful checking of the results of many tests. (*b*) To be "negative" to the D.I.T. a cow must not show an S.D. of more than 10 mm.; there must be no tenderness when tested as already described; the swelling must be either practically non-existent or hard and sharply circumscribed. No heat should be detected.

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(*c*) If the reading of the test of any animal failed to satisfy us that a definitely "positive" or "negative" result had been got, the animal was classified as "doubtful" and must be submitted to a second D.I.T. at some future date. We do not suggest that these should be accepted as general rules; it proved convenient in practice that we should, for our own guidance, lay down as definite rules as possible. Different operators would place the exact limits at points corresponding to their personal experience.

In our opinion the actual operation of injecting is most important. The same injector will not always introduce the tuberculin into the same layer of skin in the same cow and as the original skin thickness in cattle varies considerably, some variation in the actual location of the injected tuberculin must exist.

On many occasions the same tuberculin has been injected by the same injector into three adjacent sites on the neck of a cow. Mostly the three readings obtained would be equal within the limits of experimental error, but occasionally a discrepancy might occur which might cause an observer to place the reactions in different classes. Table I indicates that in one series of 18 cows so tested, eight cows showed definite positive reactions to all three tests, four were definitely negative, one gave three doubtful reactions, while in five cows the readings failed to classify the cows as definite "positive" reactors to all three tests.

The reading of reactions has been carefully studied. To check the accuracy of readings we adopted the following procedure: The reactions of the D.I.T. were read by observer A and recorded in a notebook by B. After completing the readings of the whole herd under tests, A went over every cow again and gave a second reading without knowing what his first reading was. Repeat readings were now made by B, while A recorded. In a series of 71 readings the agreements were, on the whole, satisfactory. The greatest difference in size of the S.D. made by A was 3 mm. and B 4 mm. The character of the swelling and tenderness agreed in most cases and the final verdict, "positive," "negative" or "indefinite" agreed in 62 of 71 readings. The greatest discrepancies occurred in the "negative" and "indefinite" groups, for in the "undoubtedly negative" or "strongly positive" cows there is rarely room for any difference of opinion between different observers making a reading on the same cow. There was nothing to choose between the accuracy of A and B. Table II shows the readings on two cows injected with the same tuberculin in three sites; they are chosen because of the unusually large variations in the readings.

TABLE I.

Final Diagnosis on Three Injections.	Number of Cows.
All 3+	8
All 3−	4
2 ? 1+	3
2+ 1 ?	2
All 3 ?	1

+ = Positive Reaction. − = Negative Reaction.
? = Doubtful Reaction.

TABLE II.

	Observer.	S.D.	Character of Swelling.	Tenderness.	Diagnosis.
Cow 9 ..	A	14	D	−	?+
		13	D−	−	?
		11	D−	−	?
	B	13	D	−	?−
		10	D	−	?−
		9	D−	−	?−
Cow 10 ..	A	12	D−	+	+
		10	D	+	+
		8	D−	+	?
	B	11	D	+	+
		10	D	+	++
		5	D	+	?+

Final conclusion Cow 9, "probably negative"; 10 "positive."
Third injection in Cow 10 presumably too deep.
S.D. = increase in skin thickness between original and after second injection (R.I.).
D. = Diffuse swelling.
D− = Indefinite, not clearly diffuse.

CONCLUSIONS.—The error of the D.I.T. may occasionally be considerable in that the same injector may obtain varying results with the same tuberculin in the same cow. The reading of the results is also subject to variation, especially when "doubtful" reactions are got. With reasonable care and experience these errors can, in practice, be minimised.

II.—Types of Reaction.

Our experiments indicate that three types of reaction exist: "positive," "negative" and "indefinite."

There is no hard and fast rule as to what constitutes a positive or a negative reaction, but from the rules we have laid down for ourselves (see above), we have generally had no difficulty in deciding in which of these two groups a reaction must be placed. The F.I. on varying occasions would appear to be sufficient to arrive at a definite conclusion as to positive reaction; our present impression is that 5 to 15 per cent. of our cows which were read as positive on the R.I. would have been recorded as "doubtful" or "negative" after the F.I.

There is, however, a group of intermediate cows, which give decidedly indefinite reactions after the R.I. The percentage varies from herd to herd, and our figures are not large enough to enable us to give a definite percentage. Our experiments have not been in progress a sufficient time to enable us to decide whether an "indefinite" reactor will ultimately become a "positive" reactor, but we found that some of our cows gave indefinite reactions when again tested a year later. We retested 12 such "indefinite" reactors by D.I.T. two to four weeks after the first indefinite reaction was obtained. On every occasion the second reaction was also "indefinite."

We have also records of the testing by the subcutaneous tuberculin method of such "indefinite" reactors. The subcutaneous tests were carried out at least one month after the D.I.T., and of eight cows so tested three reacted to the subcutaneous tests, one gave a "doubtful" reaction and four gave negative results. These cows are still under observation and will be retested by both methods in due course.

Conclusions.—An intermediate group of reactions has been met with to which the terms "doubtful" or "indefinite" may be applied.

III.—Specificity of the Reaction.

An increase in swelling and tenderness after the R.I. of tuberculin is specific, *i.e.*, it is not produced if the R.I. consists of plain broth or concentrated glycerine veal broth containing no "tuberculin."

This point has been tested on several occasions. In one experiment 12 cows, six "positive" and six "negative" reactors, were injected in three sites with an F.I. of the same tuberculin. For the R.I. we injected tuberculin into one area and concentrated glycerine veal broth into the second, while the third we left untouched. The R.I. of glycerine veal broth produced little change in the character of the reaction caused by the F.I. tuberculin. Where no R.I. was given the character of the reaction was more or less unchanged when readings

were made at the end of 72 hours, while the reactions caused by the R.I. of the tuberculin were definitely increased in all cases. Chart I shows results of several such tests.

CONCLUSIONS.---Our results are, therefore, in complete agreement with those of the Tuberculin Committee: the reaction produced by the repeat injection (R.I.) is specific.

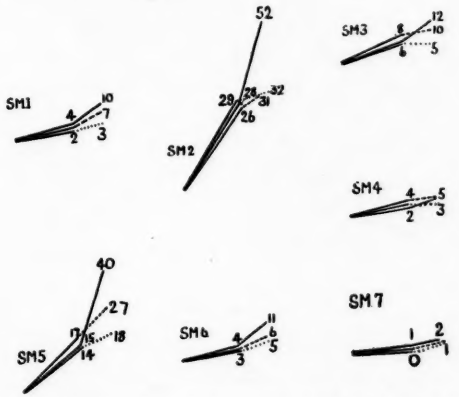

CHART I. Specificity of reaction following the R.I.
Continuous line = Tuberculin F.I. and R.I.
Broken line = ,, ,, only.
Dotted line = Tuberculin F.I. and glycerine veal broth R.I.
Figures represent increase in thickness of skin in millimetres.

IV.—COMPARING TUBERCULINS WHICH ARE EQUAL IN POTENCY BY THE OFFICIAL FRANKFORT METHOD, BY D.I.T. IN CATTLE.

The fundamental problem we set out to solve was whether the potency of two tuberculins measured by the D.I.T. corresponded to that obtained by the official Frankfort method.

We have carried out many tests on this point, and our definite conclusion is that if two tuberculins tested by the official Frankfort method and found to be equal in potency to standard are compared by the D.I.T., they will also by the latter test prove of equal potency. Nineteen pairs of tuberculin have been so tested and general agreement has been obtained. Our experience convinces us that a large number of "reacting" cows must be used to determine the point. An erroneous conclusion may be reached if a small number of cows be used, especially if degrees of reaction are considered. One example will serve to indicate how such erroneous deductions may be made. A herd of mixed cattle was injected, each receiving a dose of two different tuberculins, proved equal in potency to standard on many

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occasions over a long period by the Frankfort official test. The injections were made on adjacent parts of the same side of the neck of each animal. The injector was not aware which tuberculin he was injecting into any special site. The R.I. was made after 48 hours,

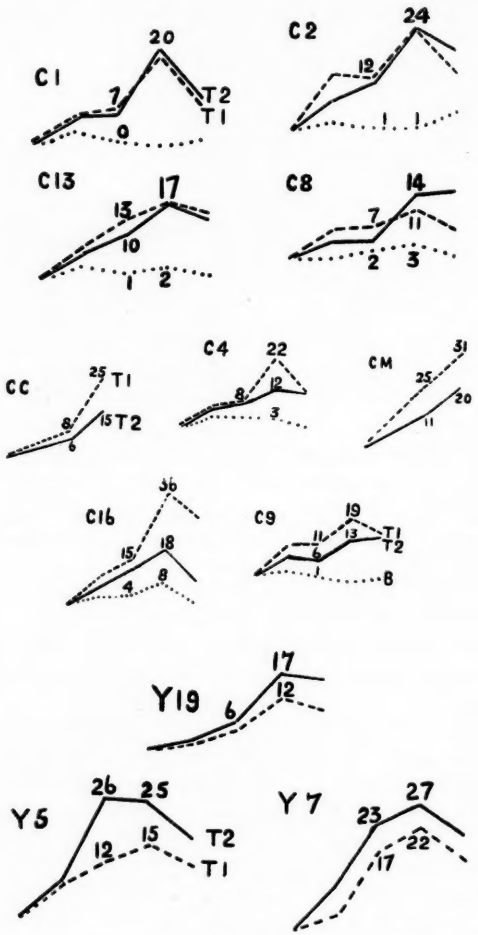

CHART 2. Comparison of Tuberculin by I.D. Test in Cattle.

Broken Line = Tuberculin T.1 for F.I. and R.I.
Continuous Line = ,, T.2 ,, ,, ,, ,,
Dotted line = Glycerine veal broth for F.I. and R.I.
Figures represent increase in thickness of skin in millimetres.

the same tuberculin being used in the same site. Twenty-two cows gave positive reactions, which are diagrammatically shown in Chart II. In 14 cases, of which C1, C2, C8 and C13 are examples, there is little difference in the degree of reaction as judged by F.D. and S.D., *i.e.*, T1 is equal to T2, while in five cows, CC, C4, CM, C9 and C16, one tuberculin gave a decidedly better reaction than the other (*i.e.*, T1 greater than T2) and in three cows, Y5, Y7 and Y19, the opposite (*i.e.*, T1 less than T2) held good.

SUMMARY AND CONCLUSIONS.—Tuberculins proved equal in potency by the official Frankfort method, and by the intradermic test in guinea pigs are also equal by D.I.T. in cattle. To make a satisfactory comparison in cattle a number of cows must be used.

For titration of tuberculins the only satisfactory method at present available is the intradermic test in guinea pigs followed by the subcutaneous test.

We are in agreement with the view arising from the article by Buxton (*Vet. Record*, 1925, July 18th) that in practical work it will increase the confidence of the veterinary surgeon if the tuberculin he is using for the test has also been shown to produce satisfactory reactions in cattle.

V.—POTENCY OF TUBERCULIN REQUIRED FOR THE D.I.T.

We are convinced that it is necessary to use a tuberculin of at least the same potency as that of the Frankfort standard to obtain a reasonable percentage of definitely positive reactions by the D.I.T. In some cases we have found it possible to produce definite positive reactions by diluting standard tuberculin once with concentrated glycerine veal broth, but this does not always hold, nor was a definite reaction ever produced by such a standard tuberculin diluted four times. We have had occasion to use a tuberculin made by Captain Douglas, which we have shown to be at least twice, but possibly not four times, as strong as our standard tuberculin by the D.I.T. method. Our colleagues (Okell and Parish) have prepared a tuberculin similar to that supplied by Douglas, and with it we have carried our many experiments in cattle. We have titrated this tuberculin against "standard" in varying dilutions; the identity and strength of the dilutions were, of course, unknown to the reader of the reactions. When used full strength it has always given a decidedly better reaction than standard, and a reaction classified as "doubtful" when standard tuberculin was used, could, on some occasions, be read as "positive" when the Douglas type of "extra strong" tuberculin was injected. We believe that the stronger the tuberculin used, the smaller will be the number of cows that will be read as "doubtful."

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Considerable difficulty has been met with in the attempts to produce this " extra strong tuberculin " on a large scale, but present experience suggests that this difficulty will shortly be overcome.

The identifying of potency of tuberculins which have been purposely diluted has been carried out. On all occasions we were able to say that one tuberculin four times as strong as the other was the better tuberculin, but we have not been able to tell on every occasion that tuberculin diluted once was less potent than the same tuberculin used full strength. One hundred and nine tests in all were carried out.

CONCLUSIONS.—A strong tuberculin gives the most accurate results. Tuberculin cannot be titrated to a great degree of accuracy by the D.I.T. method in cattle.

VI.—THE EFFECT OF ONE INTRADERMIC TEST ON SUBSEQUENT INTRADERMIC TESTS.

The effect of an intradermic dose of tuberculin on the reaction in tests at a later date has been investigated. In our earlier tests two or more preliminary D.I.Ts were done on each cow, followed a fortnight later by a single D.I.T. or, on some occasions by two D.I.Ts. From such work we formed the impression that the preliminary testing caused a " lessening " of the degree of reaction to subsequent tests in reacting cattle.

A further study, in which 32 tests were done, was undertaken later. The following are our conclusions :—

(*a*) A single D.I.T. has no influence on a second single D.I.T. one week or a fortnight later.

(*b*) Three D.I.Ts. on the same cow at the same time may influence a single D.I.T. one week or a fortnight later.

(*c*) Five or more D.I.Ts. on the same cow at the same time may considerably influence a single D.I.T. one week or a fortnight later.

(*d*) In this limited number of experiments we could find no influence of first tests on several tests made a month or more later.

VII.—THE EFFECT OF THE SUBCUTANEOUS TEST ON THE D.I.T.

We have had the opportunity of studying the effect of a subcutaneous dose of tuberculin on subsequent D.I.Ts. The following is an example of one series of tests. Five heifers showing " strongly positive " reactions to the D.I.T. were injected four to six months later with diluted tuberculin (3 c.c.) subcutaneously. All gave classical temperature reactions. Two days later three were tested by the D.I.T. method, two receiving three injections and one receiving a single injection. Four days after the subcutaneous test the remaining two heifers were each given a single D.I.T. The results shown in

Table III indicate that the subcutaneous test has some influence on a subsequent D.I.T. performed two to four days later. Further tests in which the D.I.T. was done more than one week after the subcutaneous test would indicate that at that interval there may be little effect of the one test on the other. These deductions are drawn from tests done on 22 animals only.

It may be of interest to note that one cow which has been under our observation for two and a half years, always gave a typical reaction to the subcutaneous and an entirely negative reaction to the intradermic test. Testing was carried out at least every six months during the period of observation and one month or more elapsed on each occasion between the application of the subcutaneous and intradermic tests. This cow was slaughtered and *post-mortem* examination revealed extensive tubercular lesions in the lungs, pleura, pericardium and intestinal wall. Acid fast organisms were demonstrated in these situations and guinea pigs inoculated with the pathological material have developed generalised tuberculosis.

Conclusions.—A dose of tuberculin subcutaneously may influence the reaction of a D.I.T. done two to four days later.

Table III.

Heifer.	Subcut. Test Reaction.	Interval.	D.I.T. Reaction.
1	+	2 days	+
2	+	2 ,,	(*a*) ? (*b*) — (*c*) —
3	+	2 ,,	(*a*) + (*b*) ? (*c*) ?
4	+	4 ,,	—
5	+	4 ,,	—

All were positive to the D.I.T. four to six months before the subcutaneous test.

+ = Positive Reaction. — = Negative Reaction. ? = Indefinite Reaction.

General Discussion.

We feel that a practitioner commencing this work should not fear to put all animals that he cannot certainly call "positive" or "negative" into an "indefinite" or "doubtful" class, listed for a

second test at a future date. With increasing experience he will put fewer in the " doubtful " class, but even after considerable experience and even with a continuous supply of " extra strong " tuberculin, there will probably always be a small number of cows that must be put into the " doubtful " class. And indeed one would expect this, for we know that if a group of guinea pigs be infected with living culture of tubercle they commence by being completely negative to all tuberculin tests and end in, say, three or four weeks, by being positive to all tests. There is an intermediate period during which a subcutaneous or intradermic test gives a result so little differing from that on an uninfected animal that one cannot say with certainty which is the infected animal, *i.e.*, the result is " indefinite " or " doubtful."

With regard to the question of " doping " or " plugging " tuberculous cattle with tuberculin so that they will not subsequently be detectable by the ordinary tests, our experience early inclined us to the belief that the D.I.T. may, under certain conditions, fail to detect a tuberculous animal that has been recently injected with tuberculin. It would probably take carefully controlled experiments on a very large number of animals to make a decision on this point certain and this we were unable to do. We therefore wrote to several authorities in the U.S.A. where the intradermic subcaudal single injection test has been used on a very large scale.

Dr. Kiernan, the Chief Veterinary Officer of the Tuberculosis Eradication Division, Bureau of Animal Industry, Washington, kindly gave us permission to quote his experience. He finds that tuberculous cattle, after either subcutaneous or intradermic test, may respond capriciously to subsequent tests. Some will respond repeatedly, while others may fail to respond again for a long period. (Another American veterinary officer has informed us as the result of his experience that tuberculous cattle can be doped so that they will not respond to any kind of tuberculin test.)

With regard to " indefinite reactors," Dr. Kiernan states that the tendency of opinion is that all indefinite or suspicious reactors are best removed from a herd if one is attempting to build up a tuberculosis-free herd, for the State records show that a large percentage, in some instances 50 per cent. of such indefinite reactors when tested again at a somewhat later date are found to give positive reactions and to be tuberculous.

The general conclusion would seem to be that although careful testing will often detect tuberculosis in a " doped " animal it cannot always be depended on to do so.

General Conclusions.

(1) It would appear to be advisable for the veterinary surgeon using the double intradermic test to check his technique occasionally by doing duplicate injections and making duplicate readings. Most bovines are readily classed as "positive" or "negative," a small group of "doubtful" reactors needs careful consideration and retesting at a later date.

(2) The increase in swelling, etc., produced by the repeat injection (R.I.) is specific.

(3) Tuberculins proved equal in potency by the official Frankfort method and by the intradermic test in guinea pigs are also equal by the D.I.T. method in cattle. To make a satisfactory comparison in cattle, a number of cows must be used. For titration of tuberculins the only satisfactory method at present available is the intradermic test in guinea pigs followed by the subcutaneous test in the same animal.

(4) A strong tuberculin gives the most accurate results. Tuberculin cannot be titrated to a great degree of accuracy by the D.I.T. method.

(5) (*a*) A single "double intradermic test" (D.I.T.) has no influence on a second single D.I.T. one week or a fortnight later.

(*b*) Three D.I.Ts. on the same cow at the same time may influence a single D.I.T. one week or a fortnight later.

(*c*) Five or more D.I.Ts. on the same cow at the same time may considerably influence a single D.I.T. one week or a fortnight later.

(*d*) There may be no influence of first tests on tests made a month or more later.

(6) A dose of tuberculin subcutaneously may influence the reaction of a D.I.T. done two to four days later.

(7) We have never been convinced that the milk yield of a herd of milking cows has been materially lessened during the 24 or 48 hours following the intradermic test.

RESULTS OBTAINED WITH THE ANTIDIPHTHERIN VACCINE OF PROF. DR. DE BLIECK AND DR. VAN HEELSBERGEN AGAINST DIPHTHERIA AND POX IN POULTRY.

By G. H. G. HOL, Veterinary Surgeon,
Purmerend, Holland.

As I have vaccinated a great number of birds according to the method of De Blieck and Van Heelsbergen it seems to me that it would be worth while to record my experiences in order that others might judge the results.

In applying Antidiphtherin I have very conscientiously kept to the following rules :—

(*a*) I have always used the vaccine within two days after its receipt.

(*b*) The vaccine was always placed immediately in the ice box when received.

(*c*) I have always vaccinated on a rather large area on the external lateral side of the leg, so that the vaccine touched the surfaces of 15 to 20 follicles.

(*d*) Wherever it was possible and practicable I inspected the inoculated birds to see whether a reaction had resulted.

(*e*) I have advised vaccination as a preventive measure to poultry keepers. There are many factors, however, which influence the degree of immunity produced. Briefly, these are as follows :—

Firstly, the virulence of the virus varies in different outbreaks to a certain extent.

Secondly, it is a difficult thing to accurately differentiate the infected from the non-infected birds. One can merely separate those birds which seem affected, and those which seem to be in a healthy state. It is the infected birds in which the virus is still in the period of incubation that depreciate the value of vaccination, according to the opinion of the poultry-keeper. A number of these birds are sure to show the disease later on. At least a fortnight must elapse after the vaccination before complete immunity has been established. It stands to reason, therefore, that at least a few of the birds in the infected flock will develop the malady. The successful vaccination of such flocks depends upon the number of birds in which the virus is in the period of incubation at the time of the inoculation.

Thirdly, I have noticed that it is sometimes dangerous to vaccinate sick birds, and the following example will show this. I vaccinated a flock of ± 300 birds, five of these were inoculated after the others and were afterwards isolated as being affected. Two days later I spoke by chance to the owner, who told me that the vaccination had been unsuccessful—the day after the vaccination three of these five had already died. I have, however, also observed that on vaccinating affected birds they immediately begin to recover after the injection. For instance, I vaccinated a flock of ± 250 birds, which were seriously affected, and in which 16 birds had already died ; after the vaccination all the birds began to recover almost immediately. This may perhaps be accounted for in the following way : it is possible that the virulence of the virus had already reached its height in this flock, and that it was already beginning to diminish. A partial immunity may have been conferred to the birds that survived which would then be

assisted by the vaccination. I shall demonstrate the inconsistency of vaccination in diseased flocks by giving the four following cases which have come under my observation.

In the second above-mentioned case avian contagious catarrh of a virulent type prevailed at the same time in the flock, therefore, of the 37 deaths after vaccination some may certainly be accounted for by this infectious disease. Taking the above-stated theoretical

	Number of Chickens.	Number Affected.	Number Healthy.	Result.
1st Case	140	35 (23 had already died)	105	None of the birds died; health improved daily.
2nd Case	887	93 (6 had already died)	794	After the vaccination 37 more of them died, 16 of which were healthy before vaccination.
3rd Case	815	20 (slightly affected) none had died	795	5 birds died after vaccination, the rest of the flock remained healthy
4th Case	187	The whole flock very slightly affected by the disease	Unknown	4 days after vaccination 5 birds died in succession, immunity had obviously been conferred to the rest.

and practical considerations into account, I draw the conclusion that vaccination in infected flocks has an inconstant action; one ought, however, not to disadvise it, seeing that in the aggregate the recovery of the sick birds after vaccination is usually assured, and in the meantime immunity is conferred on those birds which are still healthy.

Experience has further taught me that isolation of the affected birds in such cases is much to be recommended, in order to prevent

the disease spreading in the flock in which immunity has not yet been established.

How now about the preventive vaccination in healthy flocks? In order to furnish proof of its efficiency on scientific facts, one would have to set about experimenting with vaccinated and non-vaccinated birds, thus risking the investment of poultry-keepers in the venture. Now this is not always economically possible, but I have been able to get some striking proofs in my practice in this connection. For instance :—

I vaccinated 300 chickens on someone's farm ; the owner possessed 325 birds, which were divided up into 13 separate houses, so that 25 birds were in each house. We did not vaccinate the occupants of one of the houses, and in the month of November, 1925, diphtheria broke out in this house. We then took two of these affected birds and put them into two of the houses in which the vaccinated birds were still healthy (one of the 25 had died of diphtheria). In this way the vaccinated birds were exposed twice to the infection, the first time being when the disease appeared in the flock and the 25 birds which had not been vaccinated were affected (this, however, would have been a negative proof for the efficacy of the vaccination), and the second time being when the two sick birds were placed in the house beside the healthy ones. It is interesting to note that not one of the 300 vaccinated birds was affected with diphtheria during that winter (1925-1926).

A Second Case in a flock of ± 800 birds was observed in 1926, 300 of the oldest birds were not vaccinated. The other birds were vaccinated during the middle of August, 1926. Now it so happened that the flock of 300, which had not been vaccinated, was attacked with diphtheria, five of them dying, and those hens which were already laying soon ceased, while the other ± 500 birds belonging to the owner have up to the present (January, 1927) not been troubled with diphtheria. Here, in this case one may certainly assume that the vaccinated birds were exposed to the infection, for it so happened, through accidental circumstances that a few of the sick birds belonging to the affected house, came in contact with the vaccinated healthy birds. This was an unintentional proof of the exposure.

Furthermore, I have noticed that those poultry-keepers who have not had their birds vaccinated and are living in the neighbourhood of those who have taken the precaution, are often troubled with diphtheria in their flocks (this, naturally, does not apply to all poultry-keepers). The flocks of healthy chickens on which I have performed preventive vaccination have remained immune to diphtheria and pox. In so far as my experience goes, which includes some ten

thousand of vaccinations in perfectly healthy flocks, Antidiphtherin has proved to be an absolute sovereign remedy. No other vaccine used in the practice of the veterinary faculty is known to me that gives so few aberrations, including the swine-erysipelas vaccination.

There are still three considerations which I desire to draw attention to.

In the first place, when is the proper time in which to apply preventive vaccination? The answer to this question must necessarily be, that it is advisable to vaccinate birds when they are quite young, as the young birds are often attacked with diphtheria. I have known cases in which birds of two months old contracted the disease (the diagnosis of such cases has been scientifically verified). In consequence of this fact I have vaccinated young birds of various ages as an experiment, deeming one month to be the youngest age at which I could carry out the test. I vaccinated a good number at that age, and these all withstood the vaccination successfully. In all probability they have become immune as they were vaccinated in September, 1926, and now in January, 1927, not one of them has been affected, even though exposed to infection.

On one occasion I vaccinated two chicks eight days old as an experiment. These chicks did not suffer in any way from the vaccination.

Therefore, the conclusion I draw is, that it is advisable to vaccinate birds as young as possible, for according to statistic and practical experience one may assume that in general diphtheria infection is rampant in the months of September and October. It also happens that the disease makes its first appearance in the early part of July on some of the large poultry breeding farms at Waterland. At the present time on poultry farms which have an intensive industry, and where breeding is started earlier each year, I should advise vaccination in June. The oldest of the young hens are by that time four to five months old.

The second consideration is in regard to the length of time that the immunity lasts; this most assuredly lasts for at least one year, but I have reason to assume that it is of much longer duration; however, experiments in this particular direction extend over some years, and one must wait and see what results are obtained.

The third question to be considered is the fact that one is not justified in vaccinating before being absolutely convinced that no other infectious fowl disease is present in the flock. From an economical and a practical scientific standpoint this is also the chief reason why vaccination against avian pox is safest in the hands of the veterinary surgeons. Should vaccination nevertheless be performed in a flock in

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which cholera prevails (and in the above-mentioned neighbourhood it certainly is advisable to take this into consideration as cholera occurs as an enzootic), then one runs the risk of causing the greatest havoc in the poultry stock. In other parts of the country Klein's disease and fowl plague, beside cholera, must be considered.

By making the correct diagnosis of the existing infectious disease in the poultry stock one saves the owner and oneself from much deception.

THE POSITION OF THE BRITISH VETERINARIAN IN EGYPT AND THE SUDAN.

By D. S. RABAGLIATI, O.B.E., B.Sc., F.R.C.V.S., D.V.S.M.,
County Hall, Wakefield.
(*Chief Veterinary Officer to the West Riding of Yorkshire.*)

Egypt has always been looked upon as the "Country of Paradox," full of anachronisms and incongruities and probably the nearest to which it has ever reached towards becoming a British Colony was when the ex-Khedive Abbas Hilmi was deposed on the outbreak of the European War and Great Britain proclaimed a Protectorate over the country on December 18th, 1914; at the same time conferring the rulership on his Uncle, Prince Husein Pacha, who was then given the title of Sultan of Egypt. This Protectorate was short-lived, however, for after the troublous times which began in March, 1919, when a rising of large numbers of the native population took place and the people strove for what they thought would be Political Autonomy under the catchword of "Egypt for the Egyptians," Mr. Lloyd George, then head of the Coalition Government, after consultation with Lord Allenby, the British representative in Egypt at that time, withdrew the Protectorate from February 28th, 1922, making Egypt independent in so far as the internal administration of her affairs went.

Egypt never was a country where there was much scope for the British general veterinary practitioner apart from the Official Government Veterinary Inspector, who sometimes dabbled a little in private work. At one time there were eight permanent qualified British veterinarians in the Government Service and this number was often considerably added to when cattle plague—that disease the elimination of which finally crowned the efforts of the Veterinary Service—was especially rampant. Moreover, the International Quarantine Board which controls the quarantine regulations of both human beings as well as of animals, at one time employed several members of the Royal College of Veterinary Surgeons.

Under British control, a veterinary school was instituted in Cairo in 1901, which gradually developed into a very creditable educational centre. It was staffed by British personnel, the strictly veterinary subjects being taught exclusively by veterinarians. This school has trained a large number of Egyptians, who, after passing the necessary examinations, were granted diplomas to practice the veterinary profession in Egypt, so that, when owing to the political changes the Egyptian official was substituted for the British, it provided a number of Egyptian veterinary surgeons who considered themselves capable of replacing their former British teachers. The policy of the British in Egypt, despite many false accusations to the contrary, has always been directed towards the education of the native with a view to his being able to carry on by himself. Thus, when he felt himself capable of doing so, we really could not express surprise, but whether the time for this had actually arrived or not led to much difference of opinion.

To-day there remains not one British, nor even other European member of the Government Veterinary Staff, which is entirely run by Egyptians. Even in the International Quarantine Board, there is now only one British M.R.C.V.S., although there are nine veterinarians of other European nationalities employed. It is stated that at the present moment the Egyptian Government is contemplating taking over the veterinary section of the Quarantine Board and attaching it to the Government Veterinary Service of the country, whereby they will be able to dispense with the services of these ten remaining European officials, thus completing the elimination of every non-Egyptian veterinarian in the Public Service of the country. Whether they will succeed in so doing cannot yet be prophesied, for the Quarantine Board has ever been most insistent in keeping itself distinct from Government interference, but with the present tendency to dispense with outside help, if this is not an accomplished fact before very long, it will not be for want of the Government trying. Despite all this, the writer is aware that many of the Egyptian officials, although they approve on principle of Egyptian Independence, greatly regret that events have gone so fast in this direction.

At the present time, with the exception of army officers, there are only five members of the Royal College living in Egypt, one is still in the Quarantine Service, two retired officials, one doing private practice in Cairo and the fifth largely connected with racing in Alexandria.

The British troops in Egypt naturally have their quota of veterinary officers of the R.A.V.C., but these have nothing to do with Egypt proper. It is at least some comfort to be able to say that these officers

are asked by the Egyptian Director of the Veterinary School to supervise and act as examiners in the professional examination at the Cairo Veterinary School; thus showing the confidence still felt by the Egyptian veterinary surgeons for their British colleagues.

The writer is reluctantly compelled to offer little or no encouragement to any member of the profession who may be contemplating going out to Egypt to seek employment in private practice or otherwise. Without some guarantee of work among the racing community—for racing is still very much alive, both in Cairo and Alexandria—or some other definite post, the future would not be a bright one. It is only fair to say that not long ago the present Director of the Veterinary Service advertised for a European research worker for investigation on animal diseases in Egypt; but the conditions did not appear favourable enough to encourage the best to apply as the security of tenure and salary offered were not satisfactory. So far as the writer is aware, no one has ever been appointed to this post.* There is still much to be done by way of research to meet practical needs, but for a time at all events this must await a more favourable opportunity of being tackled.

When we look at the Sudan the picture is a much brighter one as regards official employment, but the outlook for any desirous of carrying out general practice appears to be nil.

The veterinary work in the Sudan, a country as large as the whole of Europe, excluding Russia, used to be done by officers of the Royal Army Veterinary Corps who were seconded for a term of years from the British to the Egyptian Army. Although many of these are still employed, there are now six civilian officers, including a director and an assistant for research, apart from those serving with the Army. The necessity of research in such a country must be apparent to all and the scope of the work and the possibilities for such workers appear to be nearly unlimited. Any young and keen veterinary graduate who is lucky enough to secure a post in the Sudan Veterinary Service must be looked upon as fortunate indeed. The Sudan is so far untrammelled with international political difficulties such as have beset our work in Egypt, and the administration, which is purely British, is probably second to none in our Empire. The days for an official going to the Sudan merely to have a good time in shooting big game and so on are now over and the type of man required is the keen and earnest worker with sufficient human sympathy to gain the respect and confidence of the native races with whom he has to work.

* Since writing the above, information has been received that an Italian investigator has been appointed to fill the position referred to.

THE BOMBAY VETERINARY COLLEGE.

In the year 1883 the Government of Bombay decided to establish a Veterinary College with the object of providing a class of persons competent to treat scientifically the different maladies to which cattle are subject, and thus to spread a knowledge of the nature of these diseases and their remedies. With this object in view a committee was formed to consider ways and means, and as a result of its recommendations the Bombay Veterinary College was established by Lord Reay's Government in 1886. The Committee found it to be impossible with the funds to be made available to establish a Government hospital for animals in connection with the College, and therefore recommended that the College should be affiliated to the "Bai Sakarbai Dinshaw Petit Hospital for Animals," an institution which had been established

Fig. 1.—The Main Building.

in 1882 by Sir Dinshaw Manockjee Petit, in connection with the Bombay Society for the Prevention of Cruelty to Animals. This was done and the College was established on the estate of the Bai Sakarbai Dinshaw Petit Hospital. It was arranged that certain buildings belonging to the Hospital should be handed over to Government as College buildings, and that other buildings in connection with the College should be erected by Government, that all the teaching and clinical work of the College and Hospital should be in the hands of the College professors; but that the general management of the hospital and the patients in it should remain in the hands of the officers of the Society for the Prevention of Cruelty to Animals, working under the Secretary of the Society. In this way a dual control was established,

which it was hoped would be beneficial to both the College and the Society. In practice, however, this arrangement has proved to be open to serious objection because not only have the religious sentiments of the Jain and Hindu members of the Society to be respected, and restrictions imposed on very necessary professional activities, but also because a dual control is not a satisfactory form of management for a large progressive veterinary institution; especially when a hard and fast line is drawn between medical treatment and general care and management.

The College was opened on August 2nd, 1886, in a large bungalow which had been handed over to Government for the purpose, standing on the Hospital estate. Other buildings, including a dissecting room, *post-mortem* room, chemical laboratory, students' quarters, and a

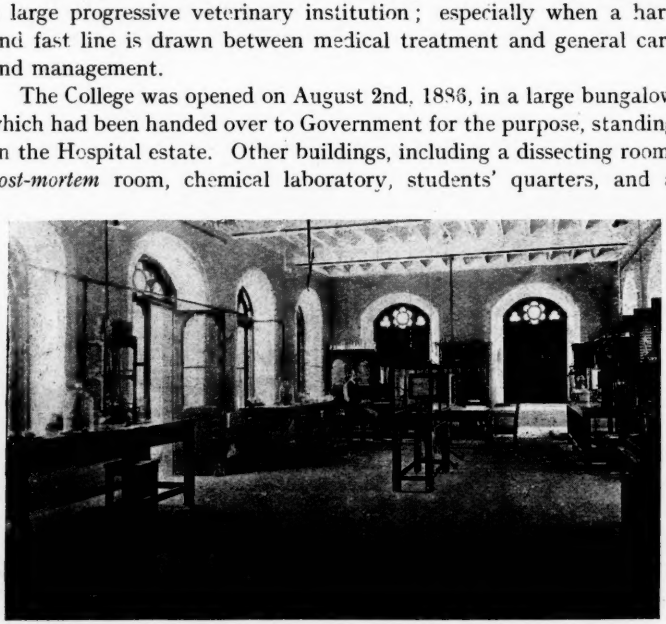

FIG. 2.—The Dissecting Room.

forge, were added from time to time. A "Patho-Bacteriological Laboratory" was erected by Sir Dinshaw Manockjee Petit and handed over to the College in 1891, on certain conditions, and with certain restrictions as to its use. A lazaretto was added for animals suffering from contagious diseases in 1895. In the year 1906 in consequence of the increasing want of accommodation, the Bombay Government purchased a plot of land adjoining the Society's Hospital and erected on it a College containing class-rooms, museum, library, lecture theatre, offices and a students' hostel with accommodation for 76 students. In 1923 a new lazaretto was added.

The College staff at the opening of the College consisted of the Principal, Professor J. H. Steel, F.R.C.V.S., and three Indian medical men. Later the medical men were transferred elsewhere, when

trained veterinarians became available from the College. Professor Steel died in January, 1891, and was succeeded as Principal by Veterinary Major J. R. Rayment, A.V.D., who in turn was succeeded by Veterinary Major James Brodie Mills in August, 1891. Lieut.-Colonel F. Joslen succeeded Lieut.-Col Mills in 1904 and Mr. K. Hewlett succeeded Colonel Joslen in 1910. Besides the Principal and the Indian staff, an appointment for an officer with a British diploma was created in 1893, and this was held successively by Veterinary Captain H. T. Pease, Veterinary Lieutenants Farmer and Baldrey, Mr. Hewlett and Mr. M. H. Sowerby, the latter holding charge from 1904 to 1924, when he retired. The staff now consists of the Principal, Major Kenelm Hewlett, O.B.E., I.V.S., the Professor of Veterinary Science, Mr. Phadke, Professor Khan Sahib Shaikh Ahmed, Professor

FIG. 3.—The Horse Hospital.

Miranda, Professor Nair and Professor Mohey Deen, M.R.C.V.S., and a Lecturer, a House Surgeon, and a Dispenser. Staff Sergeant Farrier G. Burt is the Instructor in Shoeing.

The course has been a three years' course in English since the foundation of the College, but the standard has varied from time to time. Professor Steel's aim was to establish a course of instruction comparable to that conducted at the Royal Veterinary College, London, and he wished to obtain recognition for the Bombay College diploma from the Royal College of Veterinary Surgeons. With this object in view he drew up a syllabus for an advanced course which was brought into force at the College in 1890, but before the termination of the first year of this new course he died. Within a year it was found that Professor Steel's syllabus was too advanced and was

inappropriate to the conditions then pertaining in India, so that it was modified and simplified. Notwithstanding this simplification, the Bombay course remained the highest standard of veterinary training in India for many years. In January 1900 a conference of the principals of the various veterinary colleges and schools in India was held at Umballa to consider the most suitable curriculum for bringing about uniformity of teaching at the various veterinary educational establishments in India. This conference, known as the Umballa Conference, laid down a course of studies for all colleges in India, thus ensuring uniformity. In consequence of this the written examination at the Bombay College was discontinued and the course simplified and made uniform with those at the Lahore and Bengal Colleges, and a solely oral test introduced. This curriculum remained

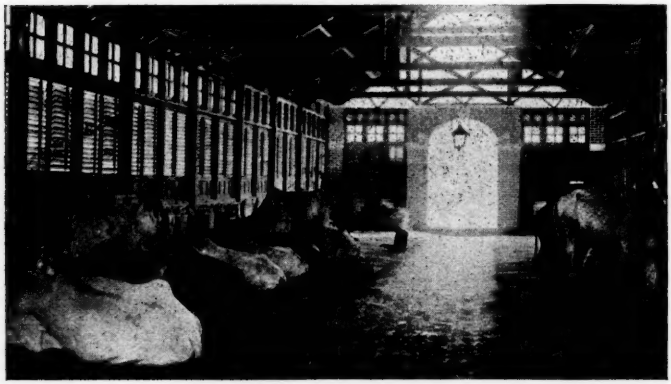

FIG. 4.—The Cattle Byre.

the basis of all veterinary curricula until the year 1912, when the Inspector-Generalship of the Department was abolished and co-ordination of veterinary education in India ceased to exist, and each province settled the curriculum of its own college without reference to that of other colleges elsewhere in India.

The war came and was followed by the political reforms which crippled the financial resources of the Bombay Presidency. Some provincial governments were able to allocate ample funds to veterinary education, but not so the Bombay Government. The money so urgently needed for keeping the Bombay College course to the front could not be found, the highly trained staff so necessary could not be employed, the laboratories and equipment so urgently needed could not be provided, and as a consequence a four years' course of

scientific training in veterinary science could not be introduced; and the Bombay College, which had so long held pride of place in veterinary education in India had to yield the palm to the Punjab College with its four years' course, its splendid equipment and its large and highly-trained staff and ample funds. Notwithstanding this, the Bombay College has continued to give a highly efficient three years' course of veterinary training. The clinical facilities provided for the students are unrivalled in India, very large numbers of cases of all sorts among horses, cattle, and dogs, being demonstrated to the students, whilst the Bombay City and Harbour Veterinary Department and the Municipal Veterinary Department provide ample facilities in the way of material for the study of epizootic diseases and the practical demonstration of meat inspection. The written examinations have once more been introduced in addition to the oral

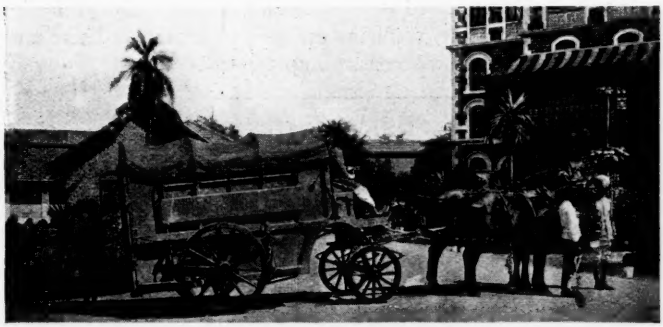

FIG. 5.—The Ambulance.

examinations, and certain subjects have been regrouped so that they provide for the study of the more recent branches of veterinary scientific work.

The number of students, which is now 120 in the College, has varied greatly, but of recent years there has been a considerable increase in the number. During the 41 years of its existence 531 students have passed out with the Diploma of G.B.V.C. (Graduate of the Bombay Veterinary College). Of these many have distinguished themselves, and amongst them may be specially mentioned Khan Sahib Dhakmarvala, for 38 years on the Staff; Mr. George D'Silva, for 21 years Assistant Principal of the Madras Veterinary College; the late Mr. Brand, Assistant Principal of the Bengal Veterinary College; Major Simpson, late R.A.V.C., Superintendent Civil Veterinary Department, Mysore; the only graduate of an Indian College, as such,

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granted a commission in that corps, the late Khan Bahadur Haji, of Karachi; Mr. Albuquerque, of Palitana; Major Edibam, of Gwalior; Mr. Batliwala, of Burma; Khan Sahib Shaikh Ahmed, of the Bombay Veterinary College; Mr. V. R. Phadke, the present Professor of Veterinary Science at the College; Khan Sahib Buxy, of the Bombay Civil Veterinary Department; Khan Sahib Dubash, late Deputy Superintendent of the Bombay City and Harbour Veterinary Department, and many others. Graduates of the Bombay Veterinary College have spread far and wide. They are to be met with in Ceylon (where the greater number of veterinary practitioners and veterinarians of the Government service are graduates of the Bombay College), in the Federated Malay States and in the Far East, in Mauritius, East Africa, Zanzibar, Aden, etc. etc. Some graduates have even gone as far afield as Brazil and the West Indies. Some, finding that the veterinary profession offered insufficient scope for their abilities, have ceased to practise and, entering other professions, have done well in law, medicine and administration. There are no unemployed graduates who desire employment.

Clinical Articles

NOTES ON THE RESULTS OBTAINED FROM THE TRANSFUSION OF A SOLUTION OF FORMALIN INTO THE BLOOD STREAM IN THE TREATMENT OF PNEUMONIA.

By Major FRANK CHAMBERS, O.B.E., F.R.C.V.S.
(late R.A.V.C.), Wolverhampton.

The treatment of pneumonia by the above method, as suggested by Major-General Smith, consists of injecting one pint of half per cent. solution of formalin in hot sterile water into the jugular vein. The method we employed was to insert a small trocar and canula into the jugular, after first clipping the hair from the seat of the puncture, and applying tincture iodine. A length of rubber tubing, which had at one end a funnel, was attached to the canula—the whole apparatus being previously sterilised by boiling—and the hot solution poured into the funnel, which was raised in order to secure the passage of the solution into the jugular vein.

The first cases had been under treatment for several days before they were injected, and the results were bad; only one case out of seven making a recovery. The next six cases were injected as soon as they were discovered to be showing symptoms of pneumonia; all these cases made a recovery; which, if slow, was certain. The injections were given daily until either the temperature dropped, or the animal was apparently much better and evinced a desire for

food. The attached temperature chart show the progress of the cases, and the number of injections given.

After the injection of formalin was discontinued quinine sulph. half ounce and strychnine sulph. half gr. was given daily in a ball. The administration of quinine facilitates the recovery of the case. In fact quinine sulph. and strychnine given twice daily is itself good treatment. Eight cases were treated in this manner, of which six recovered and two died. *Post-mortem* examinations held on those cases which died revealed a number of secondary abscesses in the lungs, the after effect of an attack of strangles, and it is doubtful if any treatment would be of much use in these cases.

Attached are temperature charts and records of a few of the cases that have been treated during the past two months (1916).

FORMALIN.

No. of Horses Treated.	Treatment Adopted as Soon as Admitted to Hospital.	Treatment Deferred Several Days After Admission.	Recovered.	Died.	Per Cent. of Recoveries.
7	—	*	1	6	14.28
6	*	—	6	—	100
QUININE TREATMENT.					
8	*	—	6	2	75

* Indicates date of treatment.

GRASS DISEASE.

BY G. MAYALL, M.R.C.V.S.,
Bolton.

ON June 29th I was called to see a bay cart horse, 12 years old, that was breathing rather heavily and had some difficulty in swallowing. He had been recently brought up from grass off land with little or no shelter, and during the time he was out many of the days had been rather warm and the nights cold. The horse's temperature was 102 and the pulse 75. On giving him some hay he chewed it, but was unable to get it over the back of his tongue. He received some electuary of sodæ hyposulph. pot nit, glycyrrhiza and treacle, and his throat was rubbed with liniment. Next day he had not

dunged, his swallowing was no better and there was laboured breathing with a marked sub-costal ridge and sweating under the tail. His penis was pendulous. His rectum was full of dung and he was back raked and an enema given him. As giving a drink was risky, he received a ball of aloes, 1 drachm; ext. taraxacum, 1 drachm; mass zingib co, 4 drachms; resin, 2 drachms. This ball had to be given with the aid of a mouth gag.

Briefly, during the course of the 18 days' illness of the horse he received one of the above balls daily, together with two daily doses of nux vomica as an electuary. He had to be backraked daily, the rectum at any rate not being able to void fæces. On July 1st a liquid blister was applied to his throat. He became progressively weaker, more tucked up in the abdomen, shivered over the flanks, perspired under the tail. On giving him a nux vomica, camphor and ammonia drink he had some difficulty in swallowing, and on lowering his head some drops of fluid came down his nose, followed by a few scabs. We found these scabs on two or three occasions when sponging out his nostrils. On July 16th, on walking him back to the box after having him out he dragged his hind feet over the ground. The horse got down in the box on July 17th and being too weak to rise, was shot.

POST-MORTEM.—Left lung congested and œdematous right lung congested, a large *ante-mortem* clot partially blocking up the left ventricle and aortæ. The Ammon's horn was taken out for examination. The stomach was empty, the colon by no means impacted, and the rectum practically empty. The ethmoid bones were yellow and necrosed.

REMARKS.—The most noticeable features about the case were the continued shivering over the flanks, the torpidity of the rectum and sweating under the tail, the difficulty in swallowing, which improved after blistering the throat, the tucked up abdomen and sub-costal ridge and the advancing paralysis of the hind limbs during the last days. Linseed tea, treacle, milk, malt and bran mashes and some clover were given as diet, but the horse was unable even to make moderate use of them.

WIRE IN THE THROAT IN HORSES.

By W. TOPPIN HEWETSON, M.R.C.V.S.,
Brampton.

THE first subject was a four-year-old Clydesdale mare suffering from what was considered ordinary pharyngitis. The temperature was slightly high, pulse about 60 beats per minute and the appetite almost lost. She could not eat dry food, but tried to take gruels. Evidence of pain was shown on manipulating the pharynx, but there

was no distinct swelling. The throat was blistered with ol cantharides, and an electuary left to be given, a portion three times daily. I did not then, from the symptoms present, consider the case serious. Eight days later I found the horse much worse. The pharynx now was much swollen externally, particularly on one side, and much more painful to the touch. The patient now had difficulty in breathing, due to an abscess that had formed. An exploring needle was pushed into the most prominent point of the swelling, and on withdrawing the needle a little pus oozed through the small opening made. On this being carefully enlarged, a large quantity of pus with a putrid smell flowed from the opening. On introducing my finger into the cavity as far as it would go, I was able to touch what felt like a piece of wire standing on its end, in a vertical position. I tried (but was unable) to get the point of my finger around it in order to draw it towards the opening; so a piece of wire was bent at the end similar to a button hook. The finger was introduced into the cavity with the improvised hook, which was passed round the wire in the throat, traction was applied and the pull necessary to remove it was so great that the wire broke before it could be moved. Both broken pieces were extracted, the cavity was washed out daily with a disinfectant and the horse made a quick recovery. Abscesses are a frequent occurrence in the throats of horses and elsewhere, and are dealt with by veterinary surgeons all over the country, but I record the above in order to show the importance of exploring the abscess cavity for foreign bodies.

The second case was a Clydesdale mare with foal at foot, running on grass. This mare I found had been bleeding from the left nostril. A few clots of blood were found in the pasture where the mare had been standing. The mare appeared dull, the temperature was 106° F., and the pulse quick and weak. The breathing was normal, but there was no appetite. On examination the pharynx was found to be normal, there was no swelling, and no evidence of pain on compression. I tried to administer a physic ball, but though I tried again and again, I could not get her to swallow it. The ball each time came down the nostril. Pot : chlor : and pot : nit : were given in the form of an electuary. The temperature still remained high and the pulse grew weaker and weaker. The mare refused to eat or drink and died on the eighth day. There was no recurrence of the hæmorrhage, but a disagreeable smell gradually developed in the breath. One could only conjecture as to the cause of the complaint. I thought she must have gathered up a sharp body in the grass which had injured her throat, causing the hæmorrhage. Yet I could not account for the high fever that was present throughout.

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A careful *post-mortem* examination was made of the pharynx. On the left side, close to the entrance of the posterior naris, there was found an inflammatory area two and a half inches long, and one and a half inches broad, covered with a muco-purulent exudate. This appeared to be a very slight injury or condition to give rise to such serious symptoms. In the inflamed tissue I found embedded a piece of wire about the thickness of an ordinary hair pin and one and a half inches long.

A CURIOUS CASE.

By HERBERT BUCKINGHAM, M.R.C.V.S.,
Norwich.

The following is illustrative of a curious, rather than an instructive, case.

A large white, long-furred neuter cat. The owner, a milkman, just before leaving home at 5 a.m., saw the cat on the top of a post and thought it was watching for prey.

At 10 a.m. a policeman passing saw the cat hanging upside down attached to something near the top of the post.

The cat was attached to a piece of barbed wire by its fur.

The policeman cut the wire through in two places, leaving a foot of wire still hanging to the cat.

The owner brought cat and wire to me. I chloroformed the cat and so tightly was the fur twisted that one of the barbs was quite through the skin and I had to cut through the twisted fur down on to the metal in order to release the latter.

The cat was very exhausted, but made an uneventful recovery.

PERFORATIONS IN PIGEONS' FEATHERS DUE TO THE MITE *FALCULIFER ROSTRATUS* BUCHHOLZ.

By A. W. NOEL PILLERS, F.R.C.V.S., F.Z.S.
City Veterinary Department, Liverpool.

In March of this year I examined some damaged primary feathers from the wings and tail of a self coloured tumbler pigeon. It was stated that the defective feathers had rendered the bird unfit for exhibition purposes. Living mites belonging to the species *Falculifer rostratus* were found on the feathers. On looking up the literature relating to the mite itself, its injurious effects and method of control, it became apparent that acarologists differ considerably in their views concerning the mites' life history, and that much is yet to be learnt with regard to its effect on the host. Apart from Henry and Leblois' article on treatment, I was unable to find any recent contribution to the literature on this subject. The following notes have, therefore, been written in the hope that they may be the means of getting some

of our bird practitioners to look into the condition. Allied species are found on ducks, geese, and swans. The mite belongs to the Natural Order Acarina, Sub-order Cryptostigmata, Superfamily Sarcoptoidea, Family Analgesidæ. It is well known, and is mentioned in several works on parasitic diseases of birds, one of the best accounts being in Neumann (1). It was formerly spoken of as *Pterolichus falciger* Megnin, and the present generic name has been spelt in different ways, *viz.*, *Falciger*, *Falcifer*, and *Faculifer*.

The male and female are shown in Fig. 1 and 2. Banks (2) states that there are two types of males, one resembling the female and another which has several secondary characters, *viz.*, the anterior pair of legs is long and heavy, and the immovable finger of the mandibles is greatly enlarged and lengthened. This is the form illustrated

FIG. 1. *Falculifer rostratus*. Male × 40. The second leg on the right is damaged.

FIG. 2. *Falculifer rostratus*. Female × 35.

here, but none of the males resembling the female were found. In addition to the two forms of males, the normal life cycle of *egg*, *larva*, *nymph* and *adult* is said by workers to be interrupted under certain conditions, by the appearance of a *hypopial nymph*. This is a mouthless form with a sucker plate on the ventral surface. It is often seen in the Tyroglyphidæ, and many *hypopi* are found in scrapings from horses' skins. The *hypopus* is regarded as a " travelling dress " whereby the mites are carried to pastures new by insects and even mammals. Megnin (3) figures a " normal " nymph, a large hypopial nymph which he thought turned into the male, and a small hypopial nymph which he believed became the female. The hypopus has no mouth, and the eight legs are situated two on each side at each end

of the body. The male and large hypopial nymph are figured by many writers, but the only diagram of the female is that of Berlese (4). The specimen from which Fig. 2 was taken was compared with Berlese's figure, and also with a mounted slide prepared by him, and no differences could be detected. The male which is stated to resemble the female does not appear to have been figured. The large hypopi are said to be found in the subcutaneous tissue, and several other situations to be mentioned later. They have been regarded as a distinct species. Thus there is *Hypodectes columbæ* of Slosarski, and *Hypoderas columbæ* of Murray. Although Neumann and Megnin say it is without injurious effect upon the host, the latter author is quoted by Banks and others as explaining the development of hypopi by lack of shelter and food due to the birds pulling out their

FIG. 3. Four barbs of a normal feather. × 35.

FIG. 4. Five barbs from a perforated area of a feather damaged by *Falculifer rostratus*. × 35.

feathers. The transformed nymphs are said to enter the respiratory apparatus and other organs and remain there until normal conditions are re-established. Raillet (5) suggests that these theories are not in accordance with observation. There is much, therefore, to be learned concerning this mite.

Neumann states that Kellicott found the hypopus in large numbers in the thymus of several pigeons in America. The organ had a granular appearance. They were also present in the subcutaneous connective tissue, in the air sacs of the thorax and around the anterior vena cava and the branches at its formation. He made a similar observation in the case of the thymus. In his experience the hypopi could be found in the connective tissue without the presence of adults on the skin or

feathers. He quotes Rinter as having suggested that the hypopial nymph represents a winter form at least in a cold country such as Finland.

Henry and Leblois (6) reported that this mite caused small perforations in the wing and tail feathers of carrier pigeons. Fumigation of the birds in sulphurous anhydride exterminated the parasites. Two applications of 20 minutes each were given, with an interval of eight days. The loft was disinfected by burning sulphur. No defective feathers were found after the first moult. It seems almost needless to point out that the gas must not come in contact with the pigeons' respiratory apparatus.

Fig. 3 is a low power magnification of the ventral surface of a normal feather taken about half way up the shaft and about mid-way between the shaft and the edge of the main portion. Fig. 4 shows a small perforated area which has been attacked by the mite. It will be seen that the barbs have not been destroyed, but that a large number of the barbules with their barbicels and hooks have been eaten away.

The mites remained near the shaft when the feathers were exposed to light, but became active when covered up. They were just visible in situ, when the feather was held up to the light.

1. Neumann, L. C., *Parasites et Maladies Parasitaires des Oiseaux Domestiques Paris*, 1909, p. 46.
2. Banks, N., *The Acarina or Mites—U.S. Dept. of Agriculture Report* 108, Washington, 1915, p. 123.
3. Megnin, P., *Les Parasites Articulés*, Paris, 1895, Plate V.
4. Berlese, A., *Acari-Myriopoda et Scorpiones in Italia Reperta*. Fasc xxvii, No. 6, Patavia, 1886.
5. Railliet, A., *Traite de Zoologie Medicale et Agricole*, Paris, 1895, p. 684.
6. Henry and Leblois, *Perforation de la plume d'origine parasitaire chez le pigeon. Rev. Vet.*, lxxvi, No. 10, 1924, p. 640.

A CROP-BOUND TURKEY.

By HERBERT BUCKINGHAM, M.R.C.V.S.,
Norwich.

A VERY large white male turkey, said to be valuable. Crop-bound. The crop was nearly as big as a football, very hard. I made an incision into it big enough to put my three fingers through, gradually emptying the crop of its contents in small quantities. They consisted of cabbage leaves (green and raw) and some grass. The cabbage leaves were packed very evenly and compactly—they completely occluded the osterior orifice of the crop. When I had finished I found I had a four-gallon pail heaped up, full of the contents of the crop—of course loosely put into the pail.

I sutured the skin wound only and the patient made an uneventful recovery.

I advised the owner (a doctor) to cook his cabbage leaves before giving them to his turkeys in the future.

Abstracts

VETERINARY RESEARCH IN SOUTHERN RHODESIA.

THE following paragraph, which concludes the Report of the Director of Veterinary Research (Mr. Llewelyn E. W. Bevan, M.R.C.V.S.) in Southern Rhodesia, is of interest as a "sign of the times" and the necessity for the controlling hand of a well-organised veterinary service. At the conclusion of his report for 1926, Mr. Bevan states:—

"Enough has been written, perhaps, to indicate the urgent need for Veterinary Research in this country, where the progress of the pastoral industry is handicapped and large sums of money are lost annually by disease which, in the present light of our knowledge, cannot be successfully combated. It is probable that even a small success in any one direction might amply repay the total cost of the Veterinary Research Department, which amounts to less than £7,000 a year, over £1,000 of which is recovered by the sale of vaccines and other laboratory products. Already, working under considerable difficulties, some very profitable results have been achieved, and it is claimed that the methods of inoculation against horse-sickness, red-water and gall-sickness, infectious bovine abortion, and the treatment of trypanosomiasis, originating from this laboratory, have proved of considerable value to the stock-owning community and contributed to the general prosperity of the country."

TUBERCULOSIS AS A LIVE STOCK PROBLEM IN THE MIDDLE WEST OF THE UNITED STATES.

By PROFESSOR H. R. SMITH, LIVE STOCK COMMISSIONER, *Chicago, Illinois.**

WHILE tuberculosis is found in every state of the Union there are certain sections of the country where it is very prevalent, causing great damage. The highest percentage of infection among cattle is found in the eastern states, but among hogs and poultry in the middle west. The middle west states are the next highest in cattle infection with the Pacific coast states nearly as high. The infection is not

* Abstract from Animal Pathology Exchange, University of Illinois, May, 1927.

high with any class of animals in the southern half of the country, nor in the range district.

Because of the large number of swine produced in the middle west and the high degree of infection in both swine and poultry compared with the east, it may be said that the greatest damage caused by tuberculosis is in the middle west group. There are two reasons why hogs produced in the eastern states have less tuberculosis than those in the middle west: (1) A large amount of milk is sold in liquid form and relatively less therefore is fed to hogs; (2) Hogs contract tuberculosis from poultry, of which there is much less in the east than in the middle west.

The highest percentage of infection among cattle in the middle west group of states is being found in a central belt extending east to west, taking in the southern portions of Michigan, Wisconsin and Minnesota and northern Ohio, Indiana, Illinois and Iowa. The only explanation we have of that situation is the fact that more breeding cattle, particularly those of the dairy type, have been brought into that section from farther east. The theory has been advanced that the southern states have less tuberculosis than the north because of climatic conditions. It is true that once the infection gets started in a herd it spreads faster when the cattle are closely housed, watering from one tank and feeding at large racks where more or less slobbering on the food takes place. The spreading is not induced by the climate, but rather by the closer contact. If climate is much of a factor we would expect more tuberculosis in the northern portions of Michigan, Wisconsin and Minnesota. The reverse is true. In many of those northern counties less than one per cent. of the cattle are tuberculous, while in the southern counties of those states the percentage of infection ranges from two to ten per cent. It is probably safe to say that the percentage of infection in the southern half of those three states is four times as high as the northern half. So also the percentage of infection in the northern half of Ohio, Indiana, Illinois and Iowa is at least four times as high as the southern half of these states. The real explanation is that the cattle in those sections where the infection is low are mostly native breeding cattle or feeders imported from the range country.

The State of Iowa furnished an excellent illustration of how the importation of feeder cattle has been a very small factor in spreading tuberculosis. There is probably no greater steer feeding section of the country than southern Iowa. Each year large numbers are purchased at the western markets and brought in for feeding purposes without test. Yet, with this steady influx of feeding cattle during many years past, it is now being found that the breeding cattle in

the southern Iowa counties show but little more than one per cent. infection, whereas the breeding cattle of the northern counties will average five per cent. or more. The northern counties have recently gone into dairying more extensively and in the breeding up process it is apparent that many tuberculous cattle were brought in, most of them before strict regulations governing interstate shipments were made.

The steer feeding sections of Illinois show also a much lower infection than the dairy sections. The counties adjacent to Chicago grow very few dairy cattle and nearly all are brought in from other sections. This steady flow of dairy cattle, many of them tuberculous, is responsible for the very heavy infection not only near Chicago, but New York and other large cities.

Tuberculous Poultry Menace.

While the damage caused by tuberculosis is greater in the middle west, the financial returns from eradicating the disease are also greatest here. When tuberculosis is eliminated from cattle the principal cause of condemnations among swine and also one of the causes of tuberculosis among poultry are removed. Investigations on the transmissibility of this disease from cattle to poultry are not sufficient to warrant positive statements as to the extent of this transmissibility, but we do know that there is a great deal of avian tuberculosis in the middle west where the practice of feeding skim milk to chickens is common. We know also through the investigations of Van Es of Nebraska and Graham of Illinois that tuberculosis in chickens is the cause of most of the retentions, or slight cases in swine, which cause heads and viscera to be condemned resulting in large cumulative losses.

County Area Testing Recommended.

The situation is such that we cannot afford to lose any further time or spare any necessary expense in eradicating tuberculosis as quickly as it can be done. We have gone far enough to know that this disease can be completely eradicated from large herds and that it can be practically eliminated from entire counties. County area testing has been the big factor in bringing about a material reduction in tuberculosis among cattle to date. The extension of this area testing has been made possible by—

(1) The character of the work done by veterinarians which has established public confidence.
(2) Favourable public sentiment resulting in larger appropriations.
(3) Substantial benefits derived by farmers in the counties which have been accredited.

Its success in any county has been largely determined by the men employed. If the veterinarian is reliable, industrious, tactful and painstaking, his work meets with a ready response and full co-operation, otherwise not. In our national campaign we have been exceedingly fortunate in the personnel of the six hundred veterinarians regularly employed and those assisting on part time.

When the campaign was launched during 1917, we had a Federal appropriation of $75,000 for tuberculosis eradication and a total of approximately $250,000 state funds. We now have $3,560,000 of Federal money and a total of $12,000,000 in state and county appropriations. The House of Representatives has recently increased the Federal appropriation $550,000 for the next fiscal year, and we have arranged for another hearing before the Senate Appropriations Committee, at which we will present facts to show the necessity of a larger amount. As the Senate has theretofore shown a more liberal attitude towards this work, there is reason to believe that it will be increased for the fiscal year beginning July 1st, 1926. The House of Representatives made $200,000 of the increase available on passage. We will ask the Senate Committee to make one million immediately available in view of the fact that the federal appropriation is now exhausted in Illinois, Massachusetts, Washington, Minnesota and will be in many other states before July 1st, 1926.

With these increased appropriations from year to year, the adoption of the intradermic test which has doubled the number of cattle tested per man, and with the recent extension of county area work, which facilitates the testing there has been a great increase in the volume of work done. Starting with 20,000 cattle tested under the co-operative plan during 1917, it increased steadily each succeeding year. During the fiscal year ending July 1st, 1925, the records showed a total of a little more than seven million cattle tested. Approximately one-third of the breeding cattle of the United States have been tuberculin tested, the reactors slaughtered and the premises cleaned and disinfected. As a result the retentions for tuberculosis on all cattle, including steers slaughtered under Federal inspection, has been reduced from 2·6 per cent. retained for tuberculosis during 1916 to 1·5 per cent. retained during 1925.

Avian Tuberculosis in Swine.

Condemnations in swine decreased to the same extent during that period, but retentions continued to increase until the highest point, 15·1 per cent. was reached during 1924. This was reduced last year to 14·6 per cent. The decline in cattle retentions and the increase in swine retentions made it appear several years ago that

some other factor besides cattle was causing this increase. I called attention to this seeming inconsistency at the annual meeting of the American Veterinary Medical Association at Denver and the Eastern States Tuberculosis Conference in Boston four years ago. It appeared then that poultry might be the cause of the increase in swine retentions, and mention was made of that fact. I shall always remember the disappointment that came to me three years ago when I saw the throat lesions in five hogs out of the first load to receive the ten-cent premium shipped from Hillsdale County, Michigan, to Buffalo, New York. Later loads of these accredited hogs gave retentions, but practically no condemnations. We shipped glands from these hogs to Dr. Van Es, of the University of Nebraska, who inoculated chickens and guinea pigs with them, the chickens taking the disease and the guinea pigs not in every case except one showing the type to be avian, with the hogs as the temporary host. The hogs from that county were tattooed with numbers so that those showing lesions could be traced back to the point of origin. Many were traced to farms where there has been no reacting cattle. The hogs left on the premises reacted to the avian tuberculin, but not to the bovine.

PARLIAMENTARY NEWS.

WORKING OF THE TUBERCULOSIS (ANIMALS) ORDER.

On the Report stage of the Diseases of Animals Bill,

Sir Malcolm Macnaghten moved an amendment to Clause 4 with the object of limiting to a nominal sum fees payable for tests applied to imported store cattle. He suggested that the Minister of Agriculture should communicate with the Minister of Agriculture of Northern Ireland to see if arrangements could be made for the testing of Irish store cattle on the other side.

Sir Henry Cautley (C, East Grinstead) maintained that the larger the importation of store cattle from other countries the more essential it was that the Minister should have the power sought in the Bill.

Mr. W. Guinness (Minister of Agriculture) said the tests at the most took not several weeks but two or three days. All that was asked was that where tests were imposed the burden of costs should be thrown on the party making a profit out of the transaction. The Ministry had no idea of dealing with store cattle in a manner different from that already existing. That practice would be continued and no new charges would be imposed.

The amendment was withdrawn.

The Bill passed the Report stage.

CASE OF MILK.

On the order for the third reading,

Mr. A. V. Alexander (Co-op., Hillsborough) said the Bill failed completely to meet the situation as regarded bovine tuberculosis.

Mr. Guinness said there had been a great deal of propaganda against our home dairies, and, just at a time when our agriculture was in great difficulty, it was very cruel to try to turn people away from a very wholesome food and a valuable agricultural product. It had been suggested that 50 per cent. of our cattle were tuberculous.

They had some figures as a result of the first 18 months' working of the Tuberculosis Order. In the period September 1st, 1925, to March 30th, 1927, inspections were made of premises including 1,051,000 cattle, one-seventh to one-eighth of the total head of cattle. Of these, 792,000 were cows and heifers, and of them 28,871 were found to be suffering from those forms of tuberculosis which brought them within the orders—not 50 per cent., but 2·7 per cent. The classes of tuberculosis which involved slaughter were tuberculous emaciation, chronic cough, and tuberculous udder, the last being the most dangerous because the most direct source of infection. Emaciation and chronic cough were only indirect dangers.

Reference had been made to 15 per cent. of tuberculous milk. If infected milk were mixed with clean milk, and a test was then made, they could get any figure—even 100 per cent. No doubt the half per cent. could easily be brought up to 15 per cent., sold over the counter, in certain unfortunate areas, if the half per cent. were mixed with 30 times as much clean milk. The cost of outbreaks of foot-and-mouth disease during the present year had been about £39,000.

The Bill was read a third time.—*Morning Post.*

FEW VETERINARY GRADUATES IN THE UNITED STATES IN 1926.*

ONLY one hundred and thirteen men graduated and received veterinary degrees in 1926, from all the veterinary colleges in North America. Just a few years ago a larger number were graduated each year from a number of different colleges. During and just after the World War all the private colleges closed, leaving ten state institutions with a Veterinary Department. Of these in 1926, the Iowa State Agricultural College graduated 15; Colorado State Agricultural College, 11; Ohio State Agricultural College, 20; University of Pennsylvania, 10; Texas A. & M. College, 3; University of Ontario, 12, Michigan State College, 11; Cornell University, 19; and Kansas State Agricultural College, 8. The majority of these recent veterinary

* *Veterinary Medicine*, July, 1927.

graduates have accepted position of different kinds, such as teaching, laboratory work, etc., and only a few have entered veterinary practice. So far as we can learn three of these recent graduates have located in the state of Illinois, to engage in practice, and one in Missouri. On the other hand, a large number of men who were engaged in practice have given it up to follow some other occupation. A large number of veterinarians now in practice are looking for some other opening, and would quit immediately if other profitable employment could be found. In short, the number of veterinarians in actual practice is gradually and quite rapidly decreasing. Some of the older men are retiring. The younger and middle-aged men are taking up sidelines or looking for a complete change to some other occupations. Few are joining the ranks. In a comparatively few years competent veterinarians are apt to be scarce.—Columbia (Mo.) Farmer.

ABSTRACTS FROM THE JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.

NEW VETERINARY GRADUATES.

In the July issue of our contemporary, the Journal of the American Veterinary Medical Association, we read that the last of the private colleges, that of the "United States College of Veterinary Surgeons," Washington, D.C., has now closed its doors. There were only four graduates.

All the remaining official sources of veterinary instruction are now State supported and affiliated with universities.

Of these the number of graduates at each university respectively was :—

Kansas State Agricultural College (D.V.M.)	3
Colorado Agricultural College (D.V.M.)	11
Michigan State College (D.V.M.)	7
Cornell University (D.V.M.)	25
State College of Washington (B.V.Sc. & D.V.M.)	3
Ohio State University (D.V.M.)	9
University of Pennsylvania (D.V.M.)	9

Two veterinarians of Cleveland, Ohio, filed a petition in bankruptcy recently and listed their assets as one baboon, five monkeys, one black bear, ten canaries and fourteen dogs.

The Annual Meeting of the American Veterinary Medical Association is to take place this year at Philadelphia, between the 13th and

16th of September, under the presidency of Dr. T. A. Sizler, to whom we offer our sympathy in the bad luck which has attended him since his well-merited election to this high honour and mark of the esteem in which his name is held by his colleagues. Within the past few months Dr. Sizler has been in no less than three motor crashes, the mildest result being that sustained in the last one, viz., a fractured collar bone and several bad cuts and bruises—sufficient, however, to confine him to hospital for several weeks. One hopes that it is not because he is a veterinarian that he has been singled out in this way by the motor fiend!!

Translation

FEEDING EXPERIMENTS WITH LEAD.*

By PROF. DR. H. MIESZNER,
Hannover Veterinary School.

LEAD poisoning of our domestic animals is a malady well known in the neighbourhood of lead mines, and has been recognised since the beginning of the last century. Fuchs, in 1842, wrote an article on "The Injurious Influence of Lead Mines on the Health of our Domestic Animals," and in 1922 Meyer described the complaint fully. Lead poisoning is known in the Hartz Mountains region as "Jammer" (woe-begone, miserable), and in the Rhine Province as "Kaukrankheit" (chewing-disease) on account of the salivation conjoined with biting and chewing movements. Compared with cattle, horses and goats possess far less susceptibility.

The districts of Marienberg and Goslar have suffered severely. In Marienberg in a period of 25 years (1882 to 1907) 223 of the larger animals were affected with lead poisoning, and 174 had to be slaughtered. Among poultry, half to two-thirds of the total died, so that poultry-keeping had to be given up. Also ewes were largely affected.

In Goslar in 25 years, 158 of the larger animals were affected, and 108 died or were slaughtered.

In the year 1913 I had the opportunity along with Veterinary Surgeon Zimmermann to investigate lead poisoning in a herd of 55 cows at the manor of Astfield, in Goslar. Thirty of these animals were ill, and 20 had to be slaughtered.

Emmerling and Kolkwitz made the interesting announcement that the bottom water contained 0·14 per cent. of lead oxide, and the waterlogged ground 0·285 per cent. The sand from the bottom at Hildesheim had a content of 0·405 per cent. of lead oxide. So it

* *Deutsche Tierarzt, Woch.*, May 7, 1927.

appears probable that lead in the form of lead oxide gets into the body with the food and the earth attached. Ehrenberg and Schultze, on the contrary, hold the view that washings and deposits, and sand from the mines produce arsenical poisoning. They assert that lead ore in nature is always mixed with arsenic, which latter produces arsenical poisoning, and they consider the lead of no consequence. In order to clear up some of the doubts on this matter of lead poisoning, I conducted some investigations along with Privy Councillor Arnold and Prof. Danckwortt of the Chemical Institute of the School. The experiments were made with preparations from Merck of Darmstadt, consisting of

(1) Chemically pure lead ;

(2) Chemically pure lead oxide, PbO, litharge ;

(3) Powdered lead sulphide unpurified, and containing arsenic ;

(4) Pure lead sulphate.

The experimental animals used were fowls, goats, sheep and cattle.

As in human medicine (Grawitz, Schönfeld, Münz, Naegeli), the blood of the animals was examined for basophile granulation and polychromasia. The blood in the ruminants was taken from the ear veins, in the fowl from the comb, and in ducks from the vessels between the webs. The blood smears were stained by the combined May-Grunwald-Giemsa method.

The doses of lead were given in pill form, and regulated, except in the case of the ducks, where the pills were returned by anti-peristaltic action, but here the dosing was accomplished after a four-hours' withdrawal from water. Glaser noticed lead ulcers in the stomachs of men poisoned by lead, and we also noticed such in dissection of the experimental animals.

A—Feeding with Chemically Pure Metallic Lead.

For the tests the animals used were : three fowls, two ducks, one sheep, one goat, and a two-year-old bullock.

Case 1.—Two fowls received 1·13 and 2·4 grammes per kilogram of chemically pure metallic lead for a period of 14 and 19 days respectively, and died, 28 and 9 days after ceasing the feeding trials, of progressive weakness and emaciation. If the daily doses and total quantity were increased, death resulted earlier, as was proved in a third fowl. In the blood of the third fowl polychromasia could be proved during life, and in the second and third fowl basophile granula also.

Case 2.--Two ducks were fed for six days consecutively with 4·70 grammes and 1·95 grammes of lead respectively, and died one and eight days respectively after cessation of lead feeding. Both were very ill, refused food, stood disconsolate and finally could not stand up. There was polychromasia and basophile granulation in the second duck.

Case 3.—A three-year-old ewe, 37·5 kilogrammes in weight, received daily an average dose of 0·06 grammes per kilogramme of body weight (two to three grammes) in 50 days, or a total of 121 grammes. It quickly became emaciated after an initial increase in weight, and died 2½ months after the last feeding day. On the last days before death sensorium was benumbed, gait tottering; the animal could not rise without help, urinated frequently, the eyelids of both eyes were greatly swollen.

Case 4.—A nanny goat seven months old, and weighing 11·5 kilos., received 0·15 grammes of lead per kilo. of body weight, altogether 86 grammes in 50 days, but remained healthy.

Case 5.—A two-year-old bull, weight 190 kilos., was fed with 0·027 grammes of lead per kilo. of body weight; total 83 grammes in 15 days. He increased in weight and showed no clinical symptoms of illness.

Summary.—Experiments showed that chemically pure and arsenic-free metallic lead is poisonous. Fowls and ducks died after six to nine days partaking of a total amount of 24 to 130 grammes of lead. The susceptibility of ducks appears somewhat greater than that of fowl. Large doses given over a short period produced acute lead poisoning; smaller doses over a longer period had a cumulative effect, and caused death after a longer period. A sheep died of chronic lead poisoning after 50 days' dosing with a total of 121 grammes of lead.

A goat and a bullock had 86 and 83 grammes of lead in small doses over periods of 50 and 15 days, and remained normal.

B—Feeding with Chemically Pure Lead Oxide (Litharge).

Case 1. *Fowls.*—A very well-nourished eight-months-old hen received on six consecutive days 25 grammes. The fœces were grass green; the hen became dejected, stood head drawn in, and ruffled feathers. Advancing polychromasia extending into the majority of the red blood corpuscles. In spite of good appetite at first, the hen quickly became thin; could not get up; the right wing hung down

as if paralysed. It died 12 days after the commencement, and six days after the conclusion of feeding.

Two other hens received 30 and 9 grammes in 18 and 3 days. Both died on the third and second days after the finish of the test. The red blood corpuscles were polychromatically coloured. The death of the hen that succumbed on the second day was hastened by contemporary extensive intestinal tuberculosis.

CASE 2. *Ducks.*—Two healthy well-nourished young ducks received in five days 15 and 10 grammes of lead oxide and died 24 hours after the last doses. Loss of appetite, great weakness, inability to stand, wings drooping. The blood of one duck showed no changes, but the other showed polychromasia and basophile granulation.

CASE 3. *Goats.*—A 10-months-old nanny goat, weighing 12·5 kilos., received 0·9 grammes per kilo. of body weight total 45 grammes in four days, and died one month after the last dose. The weight of the animal slowly but surely declined, at first a transitory diarrhœa arose, but later marked tympany, which was relieved by puncturing but eventually caused death. Blood changes were not noticed. If strict proof of lead poisoning cannot be furnished in the goat, so it is possible that lead poisoning may be disguised by pathological changes pointing to other causes of death.

CASE 4. *Cattle.*—(*a*) A two-year-old bull was fed 85 grammes of lead oxide in two days. Twenty-four hours after taking the preparation the animal stood with sunken head before the manger, ate nothing, and had diarrhœa. Pulse, breathing and temperature normal. Fear was so great, that the bull trembled at the slightest noise. On the following day stoppage occurred; the animal frequently looked round at his flanks and appeared to have colicky pains. The pupils were widely dilated, the appetite quite lost. Since a sudden death of the animal could be predicted, it was slaughtered. In the *post-mortem*, apart from the loaded rumen and the characteristic greyish-black colouration of the mucosæ folds of the small and large intestines as a result of formation of lead sulphate, there were no changes.

(*b*) *Calf.*—A calf, weighing 80 kilos., was given daily 0·25 grammes per kilo. of body weight, total in three days 60 grammes of lead oxide. The animal became very ill, ate no longer, showed swallowing difficulty, benumbed sensorium, complete loss of desire for food, stoppage, and died on the third day.

Summary.—Feeding experiments with lead oxide show that it is very poisonous in all test animals (fowl, duck, goat and ox). All animals showed the typical appearances of lead poisoning, such as

failing appetite, stoppage, partial loss of sensation, tottering gait, timidity, and twitching movements.

Impurities with arsenic, on account of the employment of chemically pure preparations, were barred out, so that proof is furnished that the poisoning of animals, from the drainings of lead mines, is brought about by lead, and not arsenic.

The toxicity is about two or three times greater than that of pure lead.

Comparing the susceptibility of the test animals with each other and the proportionate dose to body weight, it is the ox that is most, and the fowl least, susceptible. The order of susceptibility is: (1) ox; (2) goat; (3) duck; (4) fowl. The cause of the greater toxicity of lead oxide to that of pure lead is doubtless due to the greaer solubility of the lead oxide. Polychromasia and basophile granulation in the blood of fowls and ducks dead of lead poisoning could frequently be used as a valuable diagnostic symptom.

C—Feeding on Impure Lead Sulphide-Galena.

Fowls, ducks, a bull and a calf were fed on lead sulphide which was comparatively well borne by fowls and cattle and hens and geese, even after large doses only showed slight or transient symptoms of illness. A young bull did not react after receiving 100 grammes of the sulphide; a young calf died after 150 grammes in 12 days. The death of this animal was doubtless due to its youthfulness and slight resistance ability. The reason for the slight toxicity of lead sulphide is due to its difficult solubility. It was noticed that in the fœces of the test animals unchanged lead sulphide could be found in large quantities. *The tests in every case showed the small injurious effect of lead sulphide, whilst after the views of Ehrenberg and Schultze about galena being specially poisonous on account of its impurities with arsenic one would have expected otherwise.*

D—Feeding Trials with Lead Sulphate

on a fowl and goat gave no injurious effects.

Remarks.—The small harm from pure lead, galena, and the non-injurious effect of lead sulphate are due to the slight solubility or total insolubility of these preparations in the stomach and intestinal canal. *The drainage from lead mines and the lead present in the water around such districts is probably there in the form of lead oxide, and is taken up by animals partly in the water, and partly through the earth.*

The arsenical impurities in lead play no part in lead poisoning.

Further investigations into the proof of lead in the organs of animals dying of lead poisoning, and on the therapy of lead poisoning, will follow. G.M.

Reviews

Poultry Diseases. By B. F. KAUPP, B.S., M.S., D.V.M. London: Baillière, Tindall & Cox. 1927. 4th edition, pp. 393. Price 15/- net.

ALL veterinary surgeons who are interested in the diseases of poultry will be well acquainted with Dr. Kaupp's textbook and will welcome this, the fourth and considerably enlarged edition.

Following an introductory chapter on anatomy of the domestic fowl, there is a new feature discussing fully the physiology of the fowl; also complete discussions and methods of detection and the control of bacillary white diarrhœa fowl typhoid and cholera, blackhead, fowl pest, respiratory diseases, limberneck and tuberculosis, with diagnostic methods, preparation of vaccine and other control measures.

The number of illustrations has been greatly increased and the photographs are well done.

Diseases of other domestic birds, including the pigeon, swan, parrot, grouse, canary and goose are treated upon.

This volume is the most up-to-date treatise on poultry diseases and should be in the hands of every veterinary surgeon who includes the avian world in his practice.

Bacteriologische Diagnostik der Tierseuchen (Bacteriological Diagnosis of Animal Diseases) for Veterinary Surgeons and Students of Veterinary Medicine. By JACOB BONGERT, Doctor of Veterinary Medicine, Professor and Director of the Institute for Animal Nutrition at the Veterinary High School in Berlin. 7th edition. Revised and enlarged with 206 figures in the text and 13 coloured plates. Richard Schoetz, Wilhelmstrasse 10, Berlin. Price 36 marks.

THIS is the seventh edition of the well-known German textbook on bacteriology, immunity and protective inoculation associated with the name of Jacob Bongert. In a space of five years the sixth edition has been exhausted. The present work has been brought up to date by recording the advances made in the knowledge of blackleg, Borna's disease, the different fowl epidemics, rabies, pleuro-pneumonia of cattle, diseases of young stock and breeding animals, actinomycosis and the different meat poisons. The section on the last-named has been considerably enlarged and will be found very useful to doctors and veterinary surgeons. The most hopeful protective inoculations appear to be those in connection with blackleg, Borna disease, calf scour, and swine erysipelas.

Bongert considers that no effective vaccine against tuberculosis has yet been produced and he records nothing new with regard to distemper or canine typhus. The coloured plates in the book are exceedingly well

produced and the large number of figures in the text give ample illustrations of the many and varied bacteria the veterinary surgeon meets with in practice. The printing and get-up of the book are admirable, and no doubt it will have a wide circulation.

Annual Report of the Veterinary Officer for the year 1926. City and County of Newcastle-upon-Tyne.

Mr. Thomas Parker, F.R.C.V.S., gives another lucid and informative report of his activities. An excellent work worthy of all commendation and emulation has for many years been done annually and set down in writing by the Veterinary Officer for the City and County of Newcastle-on-Tyne. There were seven outbreaks of scheduled disease within the city during the year. Owing to an outbreak of foot and mouth disease between Thirsk and Northallerton early in the year, strict supervision was exercised over all stock arriving from South Yorkshire, but no introduction of the disease occurred. Pig carcases imported from the Continent as a means of introducing the disease were rigidly inspected ; uncleansed and undisinfected horse flesh carrying crates from the Continent also came under strict supervision.

Four hundred and ninety-five animals were found during meat inspection to be affected with tuberculosis. Within the City's registered cowsheds 11 cows were dealt with as suffering from conditions requiring the immediate withdrawal of their milk from the public supply. Five cows were slaughtered under the Tuberculosis Order and in three of them the whole carcase was condemned and in two only certain of the internal organs were taken and destroyed. Good results financially were obtained here as the local authority paid £38 9s. to the owners of the cows as compensation and received £27 12s. as salvage, together with £25 17s. 6d. from the Ministry of Agriculture (75 per cent. of compensation paid), thus leaving a balance of £15 0s. 6d. in favour of the local authority.

At the Philipson Farm Colony (run in connection with the Stannington Sanatorium for Tuberculous Children) the animals have been subjected to the tuberculin test and reactors isolated from non-reactors. For the purpose of determining the most certain and reliable method of tuberculin testing to be used under ordinary farming conditions in the building up of a "tuberculosis-free" herd experimental investigations have been conducted over a period of three and a half years, and it is hoped to complete the work during the next 12 or 18 months. Immunisation experiments are also being carried out with a specially prepared virus vaccine and vaccinated animals will be reared with a number of others unvaccinated. These experiments will require a period of between five and six years to complete. These two procedures indicate splendid work and a great example for they not only show effort on the elimination side of dealing with disease, but an equally important one to produce and rear healthy stock. Only two outbreaks of swine fever occurred and none of anthrax, parasitic mange or rabies. The various Orders of the Ministries of Agriculture and Health are listed and summarised.

The Assistant Veterinary Inspector, Mr. F. A. Davidson, B.Sc., M.R.C.V.S., left, on his appointment as Veterinary Inspector for the County of Dumfries, and Mr. H. Thornton, B.V.Sc., M.R.C.V.S., D.V.H., filled the vacancy.

Personal

PROFESSOR A. C. AGGARWALA, B.Sc. (Hons.), M.R.C.V.S., has been selected by His Excellency the Commander in Chief for a Commission as Lieutenant in the Indian Army Reserve of Officers. Professor Aggarwala graduated from the Royal Veterinary College, London, in 1924, and is now occupying the Chair of Hygiene and Dietetics in the Punjab Veterinary College in Lahore, India.

Notices

SHECHITA AND THE JEWISH METHOD OF CASTING FOR SLAUGHTER.

At a meeting of the Yorkshire Branch of the National Veterinary Medical Association, held in Leeds on Wednesday, July 27th, last, the following resolution was proposed by the President (Mr. Wm. A. Campbell, M.R.C.V.S.) and passed unanimously, several members expressing their views on the cruelty of the present method of casting and forcing the head and neck into the necessary position for the Shochet, very forcibly :—

" That we, the Yorkshire Division of the National Veterinary Medical Association, are in favour of any attempt to find a more humane method of preparation for slaughter by the Jewish method."

ROYAL VETERINARY COLLEGE REBUILDING FUND.

THE Jockey Club has sent a donation of £500 to the Fund for rebuilding and equipping the Royal Veterinary College, Camden Town, London, and the National Hunt Committee a donation of £50.

ERRATA.

MR. HOY'S ARTICLE ON " THE CLEAN MILK SUPPLY OF READING."

IN connection with the article by Mr. Hoy on the " Clean Milk Supply of Reading," the note under Figure 1 should read, " sealed unventilated 10-gallon churns " instead of " sealed and ventilated 10-gallon churns."

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE.

VETERINARY INSPECTION.

The County Council of the West Riding of Yorkshire invite applications for the post of Assistant Veterinary Inspector at a commencing salary of £400 per annum, rising by annual increments of £25 to a maximum of £600, subject to the conditions of the scale of salaries approved by the Council.

Four of these appointments will be made.

Preference will be given to applicants between 25 and 40 years of age.

Canvassing in any form, either directly or indirectly, will be a disqualification.

Forms (on which applications are to be made) and particulars of duties, etc., can be obtained on application to :—

The Clerk of the County Council,
County Hall, Wakefield.